

1 CLAIMS

2 1. A molten metal reactor including:

3 (a) a treatment chamber having a treatment chamber inlet;

4 (b) a molten reactant metal flow inducing arrangement for inducing a flow of molten
5 reactant metal into the treatment chamber through the treatment chamber inlet;

6 (c) a feed chamber having a feed chamber outlet located adjacent to the treatment
7 chamber inlet;

8 (d) an output chamber connected to an outlet of the treatment chamber to receive
9 molten reactant metal and reaction products from the treatment chamber; and

10 (e) a supply chamber connected to the output chamber and to the treatment chamber.

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12 2. The molten metal reactor of Claim 1 wherein the feed chamber outlet and the treatment
13 chamber inlet comprise a common opening.

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15 3. The molten metal reactor of Claim 2 further including a vortex inducing arrangement for
16 inducing a swirling flow in the feed chamber outlet.

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18 4. The molten metal reactor of Claim 2 wherein the feed chamber comprises a bowl shaped
19 chamber and the feed chamber outlet is located in substantially the center of the bowl
20 shape at a bottom of the feed chamber.

- 1 5. The molten metal reactor of Claim 2 further including an impeller mounted in the feed
2 chamber and adapted to be rotated about a substantially vertical axis.
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- 4 6. The molten metal reactor of Claim 2 including an off-center molten reactant metal inlet to
5 the feed chamber through which molten reactant metal is introduced into the feed
6 chamber to induce a swirling flow in the feed chamber.
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- 8 7. The molten metal reactor of Claim 1 wherein at least a portion of the treatment chamber
9 is in a heat transfer relationship with the supply chamber.
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- 11 8. The molten metal reactor of Claim 1 further including a gravity trap within the treatment
12 chamber.
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- 14 9. A feed structure for introducing a feed material into a treatment chamber of a molten
15 metal reactor, the feed arrangement including:
16 (a) a feed chamber having a feed chamber outlet located adjacent to an inlet to the
17 treatment chamber;
18 (b) a feed material inlet to the feed chamber, the feed material inlet being
19 substantially aligned with the feed chamber outlet; and
20 (c) a molten reactant metal flow inducing arrangement for inducing a flow of molten
21 reactant metal into the treatment chamber through the treatment chamber inlet and

1 through the length of the treatment chamber to a treatment chamber outlet, the
2 flow of molten reactant metal being at a rate sufficient to carry feed material and
3 reaction products into the treatment chamber.
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5 10. The feed structure of Claim 9 wherein the feed chamber outlet and the treatment chamber
6 inlet comprise a common opening.
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8 11. The feed structure of Claim 10 wherein the feed material inlet is located in a central
9 portion of the feed chamber.
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11 12. The feed structure of Claim 11 further including a containment conduit extending from
12 the feed material inlet to a level below the level of molten reactant metal in the feed
13 chamber in an area below the feed material inlet.
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15 13. The feed structure of Claim 10 further including vortex inducing arrangement for
16 inducing a swirling flow in the feed chamber, the flow having an axis substantially
17 aligned with an axis of the feed chamber outlet.
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19 14. The feed structure of Claim 10 wherein the feed chamber comprises a bowl shaped
20 chamber and the feed chamber outlet is located in substantially the center of the bowl
21 shape at a bottom of the feed chamber.

- 1 15. The feed structure of Claim 10 further including an impeller mounted in the feed chamber
2 and adapted to be rotated about a substantially vertical axis.
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- 4 16. The feed structure of Claim 10 including an off-center molten reactant metal inlet to the
5 feed chamber through which molten reactant metal is introduced into the feed chamber to
6 induce a swirling flow in the feed chamber.

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